

Timing is everything

The constant murmur of talking and sound of button pushing seeps through the faded baby blue metal double doors to the Central Control Room of the Los Alamos Neutron Science Center (LANSCe).

Inside, at the center of the dimly lit room sits a sleek, elongated, horseshoe-shaped console where four operators on the Accelerator and Operations Technology-Accelerator Operations Beam Delivery Team focus on their tasks.

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Colleagues,

It is with great pleasure I present to you this special issue of the *Pulse*. The success of LANSCCE, as a national/international user facility as well as in its paramount role of serving national security needs, is only possible thanks to the dedication and qualification of its staff. This issue is dedicated to the Beam Delivery Team. As you'll read



throughout this issue, they are one of the backbones of LANSCCE that makes the user program a great success.

So, enjoy the reading and please make suggestions for any possible future special topics.

LANSCCE Deputy Division Leader Alex Lacerda

Timing... This is the functional heart of LANSCCE, a national resource supporting basic and applied research for national security and civilian applications. Here, a small team of professionals manages one of the most powerful linear accelerators in the world, one that accelerates protons to 85% the speed of light. When these protons strike a tungsten metal target, neutrons are produced. In this way, this beam team delivers the necessary protons and neutrons to multiple experiments located across the mesa and each year supports hundreds of Laboratory scientists and international users in their novel research.

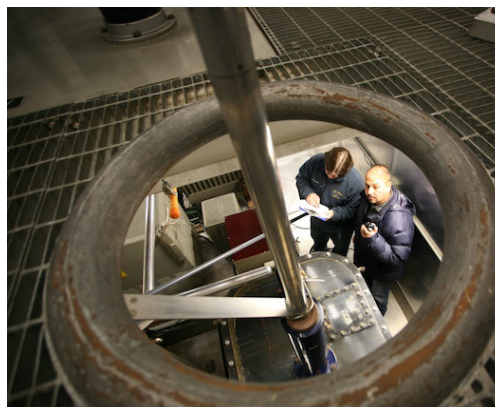
At the console, an operator presses several of the countless switches, adjusting the beam in response to changes in beam current and beam quality. Another is on the phone, reviewing the beam line schedule with a scientist and discussing any last minute

changes. An operator trainee analyzes 1 of the 18 console monitors, studying the water, magnet, vacuum, electrical, and other beam delivery systems that work together to make the accelerator beam function. Providing guidance is the senior operator at his desk in the back. It is scheduled commotion. Still, team members find time to laugh, joking and giving each other a hard time during this hectic period.

"Even though it's a high stress job, we try to keep it loose," Operations Shift Supervisor Peter Naffziger said. "It's constant communication. It's like a family atmosphere."

This special issue of the *AOT & LANSCCE Pulse* spotlights the control room and the Beam De-

livery Team that manages the accelerator and beam delivery systems. The pages that follow contain articles on the unique equipment, conversations with team members, and biographies.



Power providers

When the beam is up and running, nearly 1,150 scientists and engineers visit LANSCE to take advantage of the unique linear accelerator and experimental capabilities available at this international user facility. While those scientists are focused on their research, a team in the Central Control Room operates in the background, delivering the power to get the work done.

During the June through December run cycle, the Beam Delivery Team staffs the control room 24 hours a day, 7 days week. Sixteen team members work in 4 crews in 12-hour shifts to ensure the safe and reliable delivery of the beam lines to 5 experimental areas: the Isotope Production Facility, Proton Radiography Facility, Ultra-cold Neutrons Facility, Weapons Neutron Research Facility, and the Lujan Neutron Scattering Center.

The team directs multiple beam lines that allow for a variety of experiments to be run at once. The results are a diversity of groundbreaking research in areas such as fundamental physics, materials science and technology, bioscience, stockpile stewardship, and energy security, and medical and semiconductor applications.

Shift team operators have numerous responsibilities during the run cycle, including managing the multiple beam delivery systems that unite to make the accelerator beam function, adjusting the beam in response to changes in current and quality, troubleshooting equipment systems, restoring beam delivery after equipment malfunctions or power outages, and assisting scientists during beam development runs.



After the run cycle, the team switches gears. Members perform hands-on work assisting Accelerator and Operations Technology maintenance teams, conduct interlock checks on safety systems (see photo) to ensure that all areas are ready for beam delivery at the start of the run cycle, and train junior team members, who undergo an extensive training and qualification program.

Thomas Spickermann, team leader

Thomas Spickermann joined LANSCE as an accelerator physicist. He is now Beam Delivery Team Leader, overseeing the control room and 16 team members.

When you first meet someone who isn't a scientist or engineer how do you describe what you do?

We accelerate protons to 85 percent the speed of light for various uses. We set the accelerator ready for experiments...we make sure of the beam quality and make sure the beam hits its target. We get the beam to hit its target so that scientists from all over the world (get) use out of it. We make sure we do it safely and with quality. We also periodically test all systems to make sure that they perform as expected, in particular those systems that are designed to keep people safe.

What do you consider is your most important responsibility as team leader?

(To) make sure my people do their work safely; also to provide our users with the high-quality beam they need for their programs.

How would you characterize your team?

They are great guys, the best team on the mesa. We have dedicated and talented people. Working in crews helps them work well together. They look out for each other. They do a lot to make my job easier. We rely on people's experience from here and what they have done in the past. We like the diversity that we have because it brings people from all different backgrounds and experience...together as a team. Last, but not least, we make sure that they are highly trained to run the accelerator complex. We have a very demanding training program. It takes about two years to become a fully qualified operator, and the learning does not stop there. Add at least another five years of experience and additional formal training to become a "senior operator." It pleases me to see with what vigor our trainees go about learning everything they possibly can as well as the effort the shift supervisors and senior operators put into training them.

What is the most challenging aspect of your job?

That it's 24/7; it's all day, everyday. I have to make sure that the crews are staffed properly so that we can effectively and safely operate all the different beams. I worry about my team when I am not here. I am permanently thinking about the beam line and my team. Also, I'm thinking about what I can do for the team. I prefer that they are working with me (rather) than for me.

What do you enjoy most about being control room team leader?

Dealing with the people; it can be challenging, but rewarding. I always monitor: where can I make a difference? I like the fact that my team works so much with other teams. We are central to when other teams need help so we deal a lot with other teams. Working with other teams also makes my people better troubleshooters. Thus, they can often recover from hardware issues without having to call in the system owner/expert. To the experimenter who only has only a few hours of scheduled beam time that often makes a huge difference. The most rewarding aspect of my job is being able to promote people from the team; it shows how much we appreciate them.

What do you see in the future for the team, for LANSCE?

I see LANSCE growing, which means a lot for the team. I want LANSCE to be the signature facility of the Lab. LANSCE becoming bigger means more work and more people for the team. The team's tasks grow. That should also mean the ability to hire and train more good people.



Peter Naffziger, operations shift supervisor

Peter Naffziger is a senior member of the LANSCE Central Control Room, having joined the facility in 1989 when it was the Los Alamos Meson Physics Facility.

When you first meet someone who isn't a scientist or engineer how do you describe what you do?

I tell people two things...that I am an operations shift supervisor for the accelerator... (and) that my team and I are operating equipment that runs beams to experimental areas and targets for scientists who utilize the proton beam.

What continues to challenge you or surprise you in your work?

The accelerator is different every year. It's like a dynamic system every year because equipment is always being updated and changed. That makes the accelerator act differently so you have to learn how to handle it again with the different changes and different parts. The ion beam source behaves differently. These changes happen monthly so you constantly have to adjust and learn to do things again. The challenge is to understand the best tactics for tuning the beam.

What do you enjoy most about your job?

That every day my job is different and it is difficult. Not everyone can do it. I enjoy the challenge of making this old machine run the best that it can. I like that we are using this old machine and delivering a beam to scientists who are doing cutting-edge work.

Describe the control room when you joined the Los Alamos Meson Physics Facility.

When I started there were three control rooms—the Injector, Central, and Proton Storage Ring/Weapons Neutron Research facility control rooms. I had to learn the different accelerator systems in each, so there was a lot of communication among the three control rooms and (a lot of) learning each aspect of the accelerator in these three areas. Then, the three control rooms unified into one—the Central Control Room. It had three consoles, which meant three operators working independently. A couple of years later it became one unified console. These changes reduced the personnel it took to run the beam and made it more efficient.

What are you most proud of accomplishing in this position?

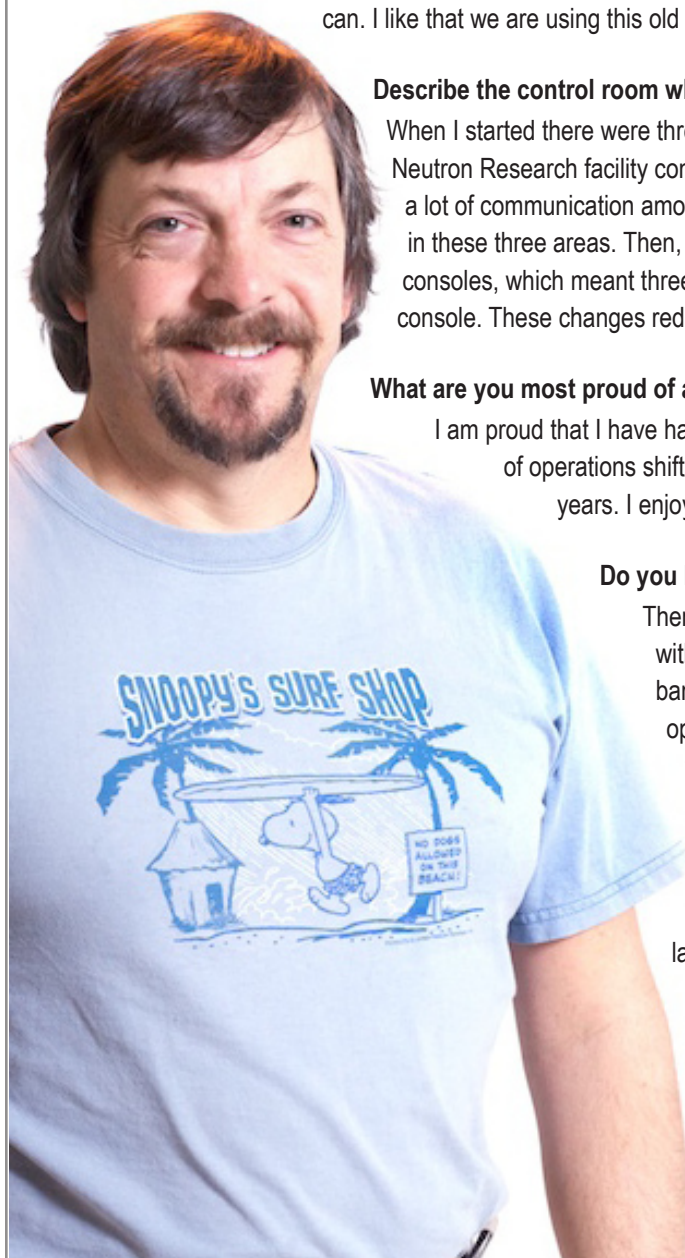
I am proud that I have had the same job since I started here and that I have moved up to the position of operations shift supervisor. I am proud that we are operating this facility reliably after so many years. I enjoy that we are providing the beams to a large and diverse group of users.

Do you have a day that stands out in your memory? What happened?

There are a lot of days with unique events. One particular shutdown, I was working with the Remote Handling and Targeting Team and we used this monster horizontal band saw to cut the highly radioactive A2 box off its vacuum flange. We work as operators in the control room nine months of the year and we spend only about three months working with different groups, so it was a unique event. We took the band saw, using the Monitor II Remote Handler to move it, and (with) me at the controls and others maneuvering the crane, we cut off the 2,000-REM/hr box from about 100 feet away. The target box leaked so we had to replace it, but the radioactive level was so high that we could not get close to it. It was a large accomplishment.

What advice do you give the new team members who have been recently hired?

Don't be overwhelmed by the size of the accelerator and the beam delivery complex. It will take a few years to get comfortable learning where everything is.



Toby King, operator trainee

One of the newest members of the Beam Delivery Team, Toby King moved to Los Alamos from Corpus Christi, Texas in July, joining LANSCE as an operator trainee.

What brought you to Los Alamos and this position?

I have a nuclear background (from) my time in the military. I was searching for an opportunity and this position attracted me because I wanted to do something different. There were a lot of other commercial nuclear power opportunities, but this was a different type of job. I liked the variety of it. My wife and I also like the area as well.

How does your background complement the work you do in the control room?

In my time in the Navy I worked with multiple operation systems. My mechanical background helps as well. I have knowledge in the electrical area so that helped with all of this electrical equipment (and)... that makes it more comfortable, but there are still a lot of things I haven't seen before. There is the same electrical and operations experience, but I have not done anything like this in my life. My background helps with some of it being familiar, but you just can't walk in here and do it all. There definitely is a lot of information to take in. It definitely is challenging, but that is one of the reasons I wanted this job.

Is working in the control room what you imagined or different and how so?

It's kind of what I figured. A lot of times it is real quiet when things are running (well) and when things are not running (well), then it is chaos—it is kind of like in the Navy. It is definitely the nicest control room I have worked in; it has LCD monitors, carpet. I am impressed with this control room. Once you become familiar with it then it is a lot easier to interpret the system.

When you first meet someone who isn't a scientist or engineer how do you describe what you do?

I tell them that I work delivering the accelerator proton beams to experimental areas to people who are a lot smarter than me... (who) use the protons for their research.

As a new hire, what opportunities are you looking forward to as part of the Beam Delivery Team?

Getting qualified. I have several levels left. I want to become a senior operator. I am looking forward to meeting people because it is interesting...to find out what all these people do. I am looking forward to seeing the facility in the future, (which) looks bright.

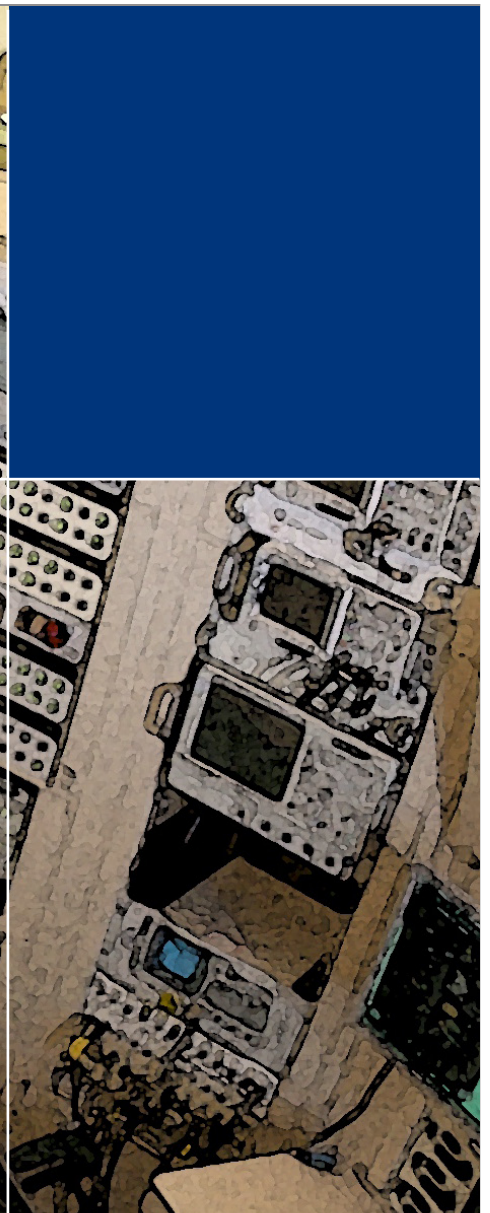
What do you enjoy most about your job?

That....I am helping with the research...being done that is making a difference in the world, such as research in radioisotopes for cancer patients. I am not participating in the research, but I am helping make it happen.

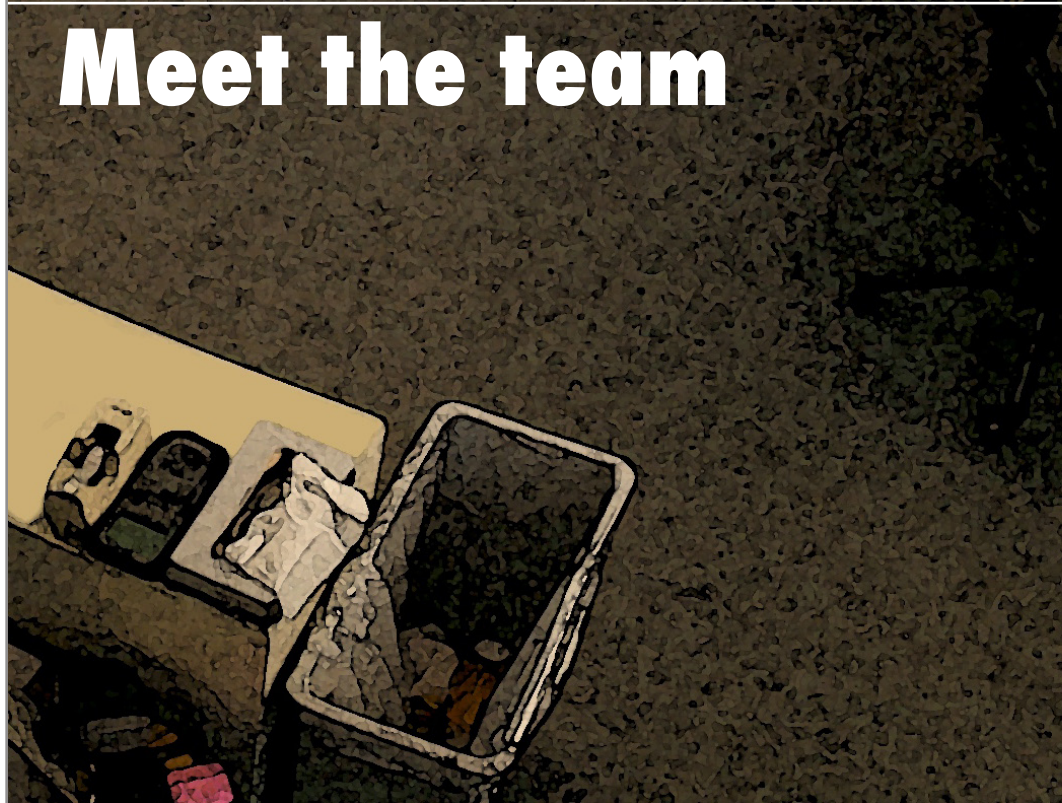
Describe a typical day.

There are rotating shifts and I work 12 hours, either day or night. I get operations updates and find out if there are maintenance issues. As a new guy, I am learning every day. I spend a lot of time watching more experienced operators and asking a lot of questions, learning my responsibilities (for) delivering the beam to pRad (Proton Radiography) and UCN (Ultra Cold Neutron projects). I am learning what they are doing because I want to do what they are doing. There is not a lot of down time. I am either learning or doing. I also go to the field to work on equipment. It's a good mix.





Meet the team





Perry J. Alberto
Operator trainee

Los Alamos experience:
Began in 2010.

Where he's from:
Born in Whitesands, New Mexico and grew up in the Albuquerque area.

Where's he been:
He was a nuclear machinist mate in the U.S. Navy on board the USS California (CGN36). After leaving the Navy he was a technician at Intel Corporation in Rio Rancho, New Mexico for 12 years before coming to work at LANSCE.



William Baldwin
Assistant shift supervisor

Los Alamos experience:
Began in August 2001.

Hobby:
Fly fishing.

Born and raised:
On a Colorado ranch.

Past experience:
Did Navy time on nuclear submarines. He also worked at Connecticut's Millstone nuclear power plant for 20 years.

Extra credit: Has taken college courses "just for myself."



David Ballard
Operator trainee

Los Alamos experience:
Began in the fall of 2009.

When not at work:
He lives in Santa Fe with his wife and child.

Education:
1997 Bachelor of Technology degree from the State University of New York Institute of Technology at Utica/Rome.

Background:
Before working at the Laboratory, Ballard was employed at Ginna Station, a nuclear power plant near Lake Ontario in New York.



David W. Bell
Operations shift supervisor

Los Alamos experience:
20 years.

Where he's from:
Grew up in Tacoma, Washington, graduating from Lincoln High School in 1980.

Background:
Entered the U.S. Navy in September 1980 as a candidate for the Navy Nuclear Power School. After completing his nuclear power training he was assigned to several nuclear-powered fast attack submarines.

LANL time:
In 1990 he left the Navy and for most of the next 20 years he worked at the TA-53 accelerator facility, going from newly hired operator to operations shift supervisor.

In the future:
He fully intends to continue his career at TA-53 and retire some time in the next 10 years.

Photo not available

Eduardo Garcia
Assistant shift supervisor

Los Alamos experience:
Eight years.

Where he's hails from: Chicago, where he attended Brother Rice High School.

Education: University of Illinois and Thomas Edison State College with a bachelor's degree in nuclear engineering technology.

Background: Served four years in the U.S. Army as an electrician right out of high school. Subsequently served in the Army Reserves for three years as a psychological operations specialist while attending the University of Illinois in Chicago. Served in the U.S. Navy as a nuclear machinist mate for six years.

LANL time: Before becoming a supervisor at LANSCE, he did a stint as a TA-55 plutonium facility operator.



Chris Hatch
Operator trainee

Los Alamos experience:
November 2009.

Where he's from:
Hatch grew up in Los Alamos.

Education:
University of New Mexico-Los Alamos with an Associate of Science degree in pre-engineering.

Powerful operator:
Before joining Accelerator Operations (AOT-OPS), he spent several years as a power system operator for the Laboratory and Los Alamos County.

Engineering his future:
He is pursuing an electrical engineering degree from the University of New Mexico.



David Henderson

Operator trainee

Los Alamos experience:

From 1975-2008, and beginning again in 2010.

Then and now:

Henderson is from Bloomfield, New Mexico. He's now living in Medanales, New Mexico with his wife, mother-in-law, and grandson.

Dive:

He spent six years in the nuclear Navy on submarines.

Past LANL experience:

He worked at Los Alamos with the Protective Systems team and now enjoys working with the LANSCE operators.

Hobbies:

He enjoys skiing during the winter and photography all the time.



Gary M. Holladay

Operations shift supervisor

Los Alamos experience:

Began in May 1989.

Multi-tasker:

Multiple-discipline bachelor's degree in mathematics, mechanical engineering, and management from the University of New Mexico. He has 660 hours of electronic vocational experience and attended for credit a two-week U.S. Particle Accelerator School course at Cornell University.

Why he's a team member:

Because the description of experimental technical facility operator for the proton linear accelerator sounded like a really interesting job.

Prior history:

He was active duty in the U.S. Navy as a data processing/radioman/information technology chief where he initially worked for the Naval Electronic Systems Command for Chief of Naval Operations and Joint Chiefs of Staff, then as a member of the U.S. Navy anti-submarine team. He has also worked at the Field Command organization in the Defense Nuclear Agency and the Joint Nuclear Accident Coordination Center, both in Albuquerque, New Mexico.

Anticipating a bright future:

He hopes to see MaRIE (the Laboratory's proposed experimental facility) become a reality.



Toby King

Operator trainee

Los Alamos experience:

Began in July 2010.

Education:

2010 Bachelor of Science in Applied Science and Technology degree in nuclear engineering technology from Thomas Edison State University in New Jersey.

In the past:

Four years as a nuclear reactor operator and six years as a flight engineer in the Navy.

Technical background:

Is electrical and mechanical in nature through his military training and post-Navy work.

He said:

"I find working as an accelerator operator to be very challenging and diverse due to the many different types of equipment that we operate and the many different operational profiles we use at this facility. The single most important part of this job is being able to meet the requirements of our users all while maintaining the utmost level of safety for personnel and equipment at this facility."

Qualified operator:

His immediate goal is to become a fully qualified accelerator operator; long-term goals include furthering his education and qualifying as a senior operator.



Mark J. McMillen
Operations shift supervisor

Los Alamos experience:

Since 1994, working his way from trainee operator to an operations shift supervisor.

The challenge:

He enjoys his job as it provides various changing challenges on a daily basis. As an operator, no two days in the life of the LANSCE accelerator are exactly the same.

Background:

After graduating from high school, he joined the U.S. Navy and completed the Navy Nuclear Power Training program as a reactor operator.

Submarine time:

That training was put to work on two nuclear-powered fast attack submarines. He has also worked as a radiological controls technician providing for depot-level work on fast attack submarines.



Earl Moore
Operator trainee

Los Alamos experience:

Began in August 2009 after retiring from the U.S. Navy.

He grew up in:

The Pacific Northwest, and after graduating from Auburn Senior High School in 1989 he joined the U.S. Navy.

All over the map:

After successfully completing the Naval Nuclear Power Training pipeline as a reactor operator, he served on 7 submarines during his 20-year naval career, completing 7 strategic deterrent patrols, a western Pacific deployment, a northern Atlantic Deployment, an Arabian Gulf deployment, 2 successful depot modernization periods, and helping with construction of 2 new Virginia-class submarines.



Peter Naffziger
Operations shift supervisor

Los Alamos experience:

Began in 1989.

Where he's from:

Born in Los Alamos to a weapons engineer father and organ and piano musician mother.

Growing up LANL:

He was raised around the Laboratory environment and became fascinated with Los Alamos Scientific Laboratory's large apparatuses such as the Antares inertial confinement laser fusion project and the Los Alamos Meson Physics Facility.

Tour guide:

He assisted in Laboratory tours for Northern New Mexico high school students during an open house and unknowingly toured the facility that would ultimately be his career.

Time in uniform:

He entered the Navy and served aboard the ballistic submarine USS Georgia (SSBN-729) carrying weapons that his father had helped develop.

Time at LANL:

He returned to Los Alamos and was hired as a junior operator at the Los Alamos Meson Physics Facility and has worked at the facility ever since.



Phillip G. Noland

Operator trainee

Los Alamos experience:
Began in August 2010.

Where he's been:

Prior to Los Alamos, he was in the U.S. Navy for 11 years where he was a reactor operator on 3 nuclear submarines.

What he's learned:

He went through almost two years of training in the Naval Nuclear Pipeline, which consisted of Naval Nuclear Electronics Technician "A" School, where he learned electrical, electronic, digital, and instrumentation and control theory; Naval Nuclear Power School, where he learned radiation theory and physics related to a pressurized water uranium-35 reactor; and Naval Nuclear Prototype School, where he received hands-on training and qualified to operate a nuclear reactor.

He said:

"I find the abilities of LANSCE fascinating and have been enjoying everything I have learned about the facility in my short time here so far. I look forward to qualifying as a particle accelerator operator here and contributing to the research and practical applications performed here."



Dennis Ortiz

Assistant shift supervisor

Los Alamos experience:
Began in 2002.

Where he's from:

He's a home-grown New Mexican.

Education:

Graduated from the Electro-Mechanical Technologies program at the University of New Mexico-Los Alamos.

Skills:

He is a qualified accelerator operator.



Thomas Spickermann

Team leader

Los Alamos experience:
Began in 1999. Became team leader in September 2008.

Education:

He earned a PhD in particle physics from Aachen University in Germany in 1994.

Background:

He earned a two-year fellowship at CERN, the European organization for nuclear research, as an accelerator physicist experimenting with the Large Electron Positron Collider and the Large Hadron Collider. He also spent nearly two years as a research associate at Harvard University, working on the Antiproton Decelerator at CERN.

Time to fly:

In his spare time, he is building a low-speed, low-flying airplane from a kit in his garage.

He said:

"What I like most about this job is the great yet diverse bunch of people on my team and how professionally they go about their duties."



Keith Stephens

Operator

Los Alamos experience:
Since 1997.

Where he's from:
Born in Dayton, Ohio. His family moved to Los Alamos in 1968.

Double take:
He has a twin brother.

Family:
Married in 1996 to a hometown girl and they now have four children.

Delivery service:
He delivered his son in the hall of his rental home, using what he learned in CPR class to give his son his first breaths after he turned blue due to a blockage in his throat.

In the past:
Toured LANSCE in high school and was impressed with the facility, but was considering a job as a police officer. He spent six years in the U.S. Navy, including four as a reactor operator on the USS Enterprise.

Giving thanks:
For the last seven years he has organized and prepared a Thanksgiving Day feast for all who are working at LANSCE over the holiday.



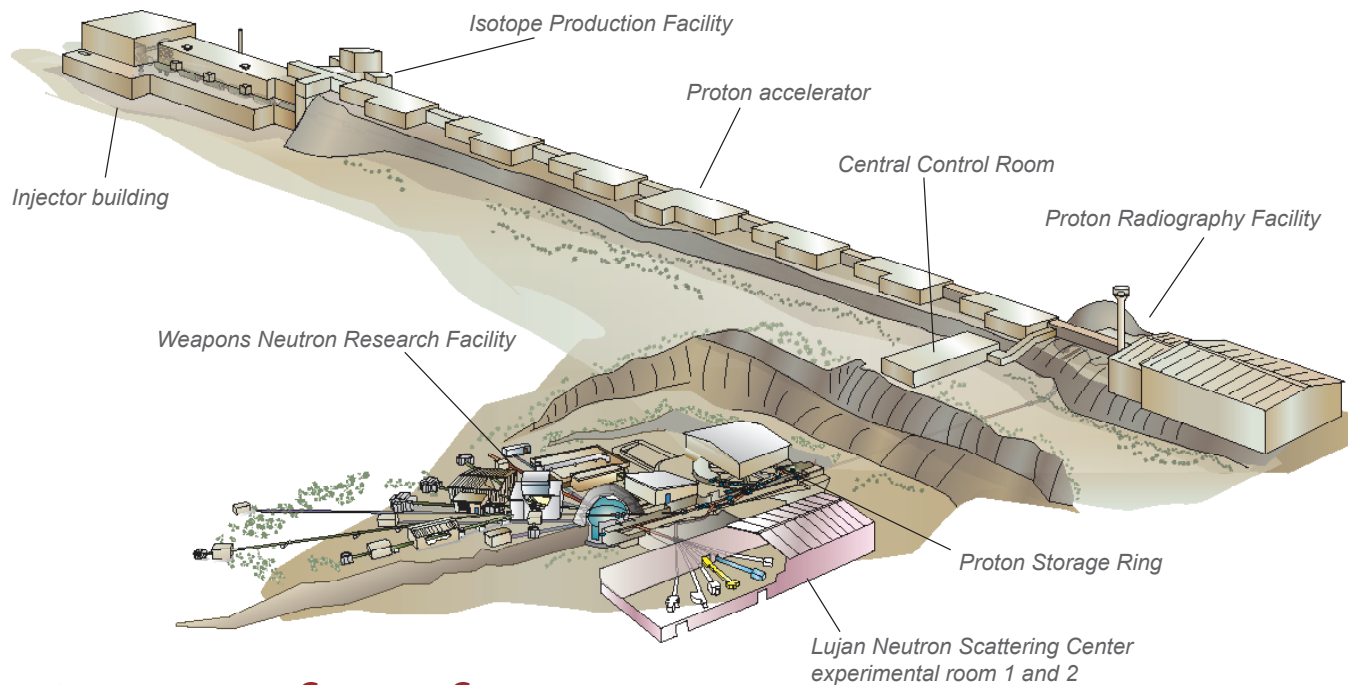
Robert White

Assistant shift supervisor

Los Alamos experience:
25 years.

In the Navy:
As a naval nuclear power plant operator for six years.

Past LANL:
He has worked in linear accelerator operations for 20 years; incinerator operations for 3 years; and as an assistant intelligence analyst for 2 years.



At the core of the LANSCE international user facility is a highly flexible linear accelerator system, which is overseen by the Beam Delivery Team.

Experimental Facilities	Reliability
Isotope Production Facility	89.1%
Proton Radiography	92.82%
WNR Target-4	86.76%
WNR Target-2	85.91%
Lujan Neutron Scattering Center	84.36%
Ultra Cold Neutrons	90.65%

The DOE Office of Science/Basic Energy Sciences considers a reliability standard of 85% to be “world class.”

LANSCE started with three control rooms in three separate facilities—Injector, Central, and Los Alamos Proton Storage Ring/ Weapons Neutron Research facility. In 1994, the control rooms converged into one central room, which is now the Operations Building, with three separate consoles. In 1998, the three consoles were exchanged for one large console.

100-million electronvolt (MeV) protons are used at the **Isotope Production Facility** to produce radioisotopes for both research and nuclear medicine.

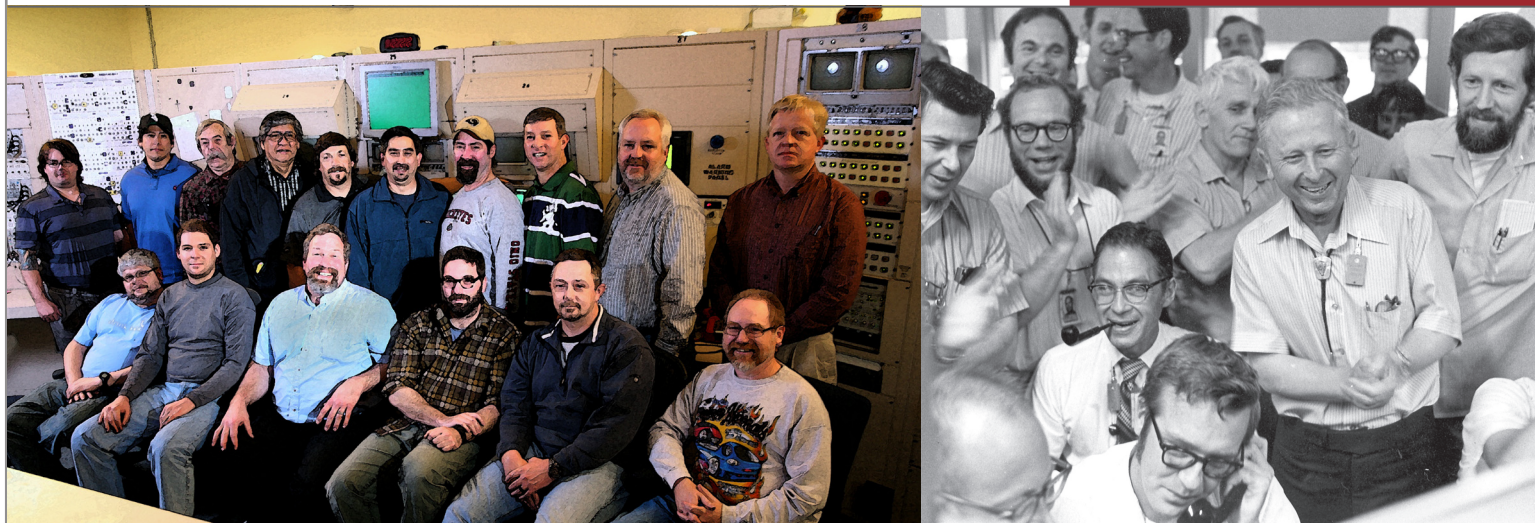
Pulses of 800-MeV negative hydrogen ions are employed at the **Proton Radiography Facility** to image dynamic events related to nuclear weapons performance and are also sent to heavy-metal targets at the **Weapons Neutron Research Facility**, where proton–nucleus collisions in the targets generate large numbers of neutrons through a process called nuclear spallation. The neutron pulses are used for materials irradiation and fundamental and applied nuclear physics research. It is also operated as a user facility visited annually by approximately 300 investigators.

The negative hydrogen ions are injected into a 90-meter Proton Storage Ring that compresses the 625-microsecond pulses into a 250-nanosecond intense burst of protons, which, through nuclear spallation, produce bursts of neutrons for neutron scattering studies of material properties at the Weapons Neutron Research Facility and **Lujan Neutron Scattering Center**. The Lujan Center is a major national research center annually hosting more than 300 scientists from around the world who perform materials science research and low-energy neutron nuclear physics studies using a variety of uniquely designed instruments.

At the **Ultra-cold Neutron Research Facility** 800-MeV protons hit a tungsten target and produce about 14 neutrons at energies of a few million electronvolts, which are reduced to cold neutron temperatures of 40 Kelvin by scattering in polyethylene moderators. As they interact with the solid deuterium inside a guide tube coated with nickel-58, the cold neutrons become ultra cold. The ultra-cold neutrons then travel through a guide tube and are detected by a helium-three detector, allowing research of fundamental nuclear physics to test the standard model of elementary particles.

LANSCE facilities are available to qualified scientists and engineers through a competitive proposal process. Each year LANSCE receives many more worthy proposals than it can accommodate. The people who conduct experiments at LANSCE represent a cross section of the research community—universities, industry, and other national and federal laboratories—and come from all over the world. One of the great strengths of the LANSCE user program is its ability to attract large numbers of graduate students and postdoctoral researchers. Maintaining a strong component of students, postdoctoral researchers, and early-career scientists is a priority for LANSCE and fulfills a mandate to help train and advance the next generation of scientific leaders—some of whom will join the Laboratory staff.

Now and then . . .



Left: the LANSCE Central Control Room team today. Right: beam achieves full power for the first time in the LANSCE Central Control Room, 1972. Louis Rosen, who spearheaded the development of the LANSCE facility, then called the Los Alamos Meson Physics Facility, is in the foreground, center.

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